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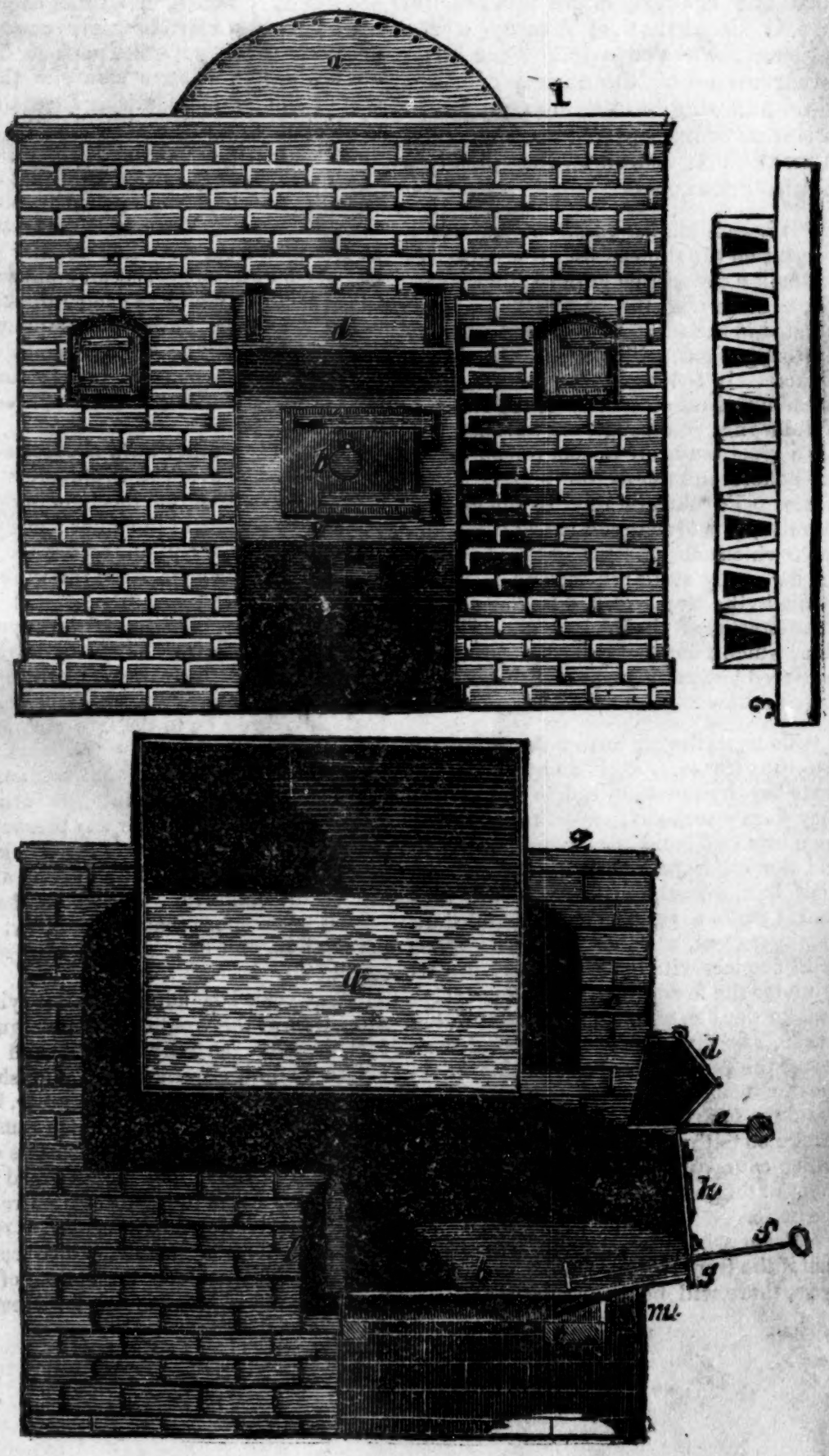
CHAPMAN'S PLAN FOR CONSUMING THE SMOKE OF STEAM BOILERS, &c.



MR. CHAPMAN'S PLAN FOR CONSUMING THE SMOKE OF STEAM BOILERS, &c.

The excellent plan for obviating the serious inconvenience arising from the dense smoke from steam boiler furnaces, &c. which we have this week the pleasure of laying before our readers, is the invention of Mr. G. CHAPMAN, of Whitby, whose ingenuity was rewarded by the large silver medal of the Society of Arts. The following is the inventor's description of his apparatus, extracted from the last volume of the Society's Transactions:—

"It is well known to all that are conversant on the subject, that it is necessary to admit a proportion of pure atmospheric air, to unite with the smoke after it is generated in the furnace, in order to supply the oxygen gas, without which it will not inflame. It is likewise known that any air admitted into the body of the furnace, if it does not go through the burning fuel, has a great tendency to cool the bottom of the boiler, and retard the generation of steam. To obviate this, is the general practice, in the construction of those furnaces which consume the smoke, to admit the air partly at the ash-pit, and partly up through the fire-bridge. I offer for the consideration of the Society, an improved plan, which I have adopted, and which has answered beyond my utmost expectations. It is as follows:—

"To heat the air before its admission into the furnace. This I do by casting the grate bars hollow from end to end, so that they form a series of parallel tubes, which open into two boxes, one placed in front, and the other behind the grate. In the front box, directly underneath the fire-door, I make a register to open and shut, to any extent, at pleasure. The other end I connect with the brick-work directly under the fire-bridge, which fire-bridge I make double, with a small interval between, say one inch; the interval to go across the furnace from side to side, or rather to incline forwards, or towards the fire-door, so as to meet and reverberate the smoke on to the ignited fuel in the grate, which causes it to inflame and become a sheet of bright fire under the bottom of the boiler.

"From what I have said, it will appear that if the front register is open, or partially so, there will be a great draught of air through it, along the interior of the grate bars, hence into the flue of the fire-bridge, and out of the orifice at top, which air will be heated in its passage through the bars, before it comes in contact with the smoke, when it will give out its oxygen, and cause it to inflame.

"Such was my view of this part of the subject in theory, and I have found it to succeed in practice, in a small engine of my own. But a farther improvement was necessary to make it quite perfect. There are few people who are aware of the extent of the mischief arising from the old method of charging a grate by the front door. Now, in my engine, (which is only two-horse power) I calculated that every time the fire-door was opened to stir the fire and replenish the fuel, there could not be less than from forty-five to fifty cubic feet of cold atmospherical air admitted into the furnace, which so cooled the heated gases, &c. that, however complete the plan was in other respects, the smoke could not possibly inflame, from being so cooled, till a considerable time after the fire-door was shut.

"To obviate this, I have adopted a cast-iron hopper above the fire-door, with a type at the bottom that has two pivots at one side and opens at the other; one pivot goes through the end of the hopper, and has a counter lever to keep the type shut when a sufficient quantity of coal for a charge is on it. The top of the hopper is covered with a lid, which I shut down during the time of firing, then, by lifting the lever which opens the type inside, the coals slide down on to the fore end of the grate bars, which is only the work of a moment. It is evident, that no quantity of cold air can thus get into the furnace; in fact, it is not possible for any person that does not see the operation of firing to know when fresh fuel is added by looking at the top of the chimney. The smoke that issues is never more than a light gray, just perceptible, but in a general way is not seen at all.

"The coals last admitted, after lying a short time at the front of the more ignited fuel, become partially cocked, and just before I admit a fresh supply, I push the last charge further along the grate, by a tool made for the purpose, which remains constantly in the furnace. It consists of a plate of iron about four inches broad; its length goes across the grate with a round bar of iron rivetted into its centre, at right angles, to form a handle, which comes through a hole made in the bottom of the fire-door, and is long enough for a man t

use with both hands, so that he can either push from, or pull towards him, to manage the fire within, without opening the fire-door, except when the grate wants cleaning, &c. For better knowing when the fire wants stirring, or replenishing, I have a hole, about an inch in diameter, in the fire-door, to look through, covered by a piece of iron, which hangs by a rivet above.

"After I have used the above instrument, I pull it up close to the fire-door, where it remains till it is again wanted; and the coals, when let into the fire, fall down beyond it.

"The above written account constitutes the whole of my improvements, as far as is required by the Society, but not the whole of the advantages gained by my invention. For instance, the durability of the grate-bars by the admission of air through them. I may add, that I examined my own yesterday, and I do not find them any worse, although they have been in use four months.

"N. B. I am perfectly aware that there are many plans of feeding furnaces by means of hoppers, yet I trust you will find my plan somewhat different; it is at least to what have fallen under my notice."

Description of the drawing.

Fig. 1, An elevation.
Fig. 2, A section.

(The same letters refer to the same parts in both figures.)

a, the boiler.

b, the fireplace.

c, the feeding hopper, with its cover, *d*, and its type, or turning bottom, with its lever and counterpoise, *e*, by means of which the coals are delivered into the fire-place.

f, a rake, by means of which the half burnt coals are pushed forward previously to letting in a fresh charge.

g, a slit below the furnace door, through which the shaft of the rake passes.

h, an eye-hole in the furnace door, through which the state of the fire is seen.

i i, an air-tight box, into the back of which the bars open, and in front of which is a register for the admission of air.

k, one of the hollow bars, the whole of which are shown in fig. 3, as they open into the box *i*, fig. 1.

l, a flue in the fire-bridge, through which the air, having passed first into the box *i*, and thence through the hollow bars *h*, passes into the furnace, and consumes the smoke.

Lond. Mec. Reg.

ECONOMY OF FUEL IN HEATING STEAM BOILERS, &c.

Sir,—I wish to call the attention of your readers to the advantage to be derived, as regards the consumption of fuel, by making the flues which surround the boiler, much narrower than is usual.—The common width is, I believe, nine inches, instead of which I would recommend them to be made not more than four, or four and a half inches wide. I think I am justified by my own experience, as well as by that of a friend of mine, who has also made the trial, in asserting that the saving in fuel, by the above alteration, will not be less than one-third of the whole. I have known it estimated at one-half, where it has been tried. I hope some of your readers will make trial of the plan, and communicate the result in your valuable work; and if, as I anticipate, it should be found to answer and become general, it certainly will be such an important saving as may fairly be reckoned a national advantage. I imagine that the principal reason for making boiler flues so wide as they are usually made, is, that a boy may be admitted into them, for the purpose of cleaning them, which purpose was, in the cases above mentioned, accomplished easily and effectually, by removing a stone or brick at each end of every flue, and passing a brush with a long handle along them; this method will have the recommendation, to every friend of humanity, of superseding the necessity of climbing boys in the instance alluded to. It will be seen that the plan is only adapted for those flues which are straight, or nearly so; but there are few which are not so. One disadvantage of the plan is, that the flues will require cleaning more frequently than when made on the present plan; but this is, I conceive, of no importance, compared to the advantage in the saving of fuel.

With these remarks on the subject, and hoping that some of your ingenious Correspondents may make the desired experiments, the result of which I shall be happy to see in the columns of your valuable Miscellany,

I remain, sir,
Your obedient humble servant,
J. S. M.

ib.

ON THE MANUFACTURE OF GLASS BEADS.

Drs. Hoppe and Hornschuch, in the Journal of their Tour to the coast of the Adriatic Sea, give the following account of the far-famed manufacture of glass beads, carried on at Murano, a place adjoining Venice:

The furnace and the white glass are similar to what is seen in the common glass-houses; but they mix with this white glass peculiar colouring substances, of which they make a great secret. The coloured glass being reduced to a melted state, a certain quantity is taken up by the blow pipe used by the workmen, and is blown hollow; a second workman lays hold of the other end of the glass ball, and both the workmen run with great expedition two opposite ways, and thus draw out the glass into pipes, the thickness of which differ in proportion to the distance. A long walk of 150 feet in length, like a rope-walk, is attached for this purpose to the glass-house.

As soon as the pipes are cooled, they are divided into pieces, all of the same length, sorted, packed in chests, and sent to the bead manufactory in Venice itself. Striped pipes are made by taking two lumps of glass from pots of different coloured glass, twisting them together, and then drawing out the whole to the proper length. They also manufacture pipes three feet long, and of the thickness of a finger; these have a ball blown at one end, and are used to tie up plants in flower-pots.

When the pipes arrive at the bead manufactory in Venice, a person picks out pipes of the same thickness, which he cuts into small pieces of the size he thinks necessary. For this purpose, a sharp iron, in the shape of a broad chisel, is fixed in a wooden block: the workman places the pipe of glass on the edge of this tool, and with a chisel-like tool in his right hand, he cuts, or rather chips the pipe into the sizes that are proper for the various sized beads.

These fragments of the pipes are then put into a mixture of sand and wood ashes, and stirred until the hollow of all the pipes are filled, in order to prevent their sides from running together by the heat of the fire. They are then placed in a vessel with a long handle, more sand and wood ashes are added, the whole placed over a charcoal fire, and stirred continually with a spatula, resembling a hatchet with a round end. By this simple means they acquire the globular figure. The sand and wood ashes are then separated by sifting, and the beads themselves sorted by other sieves, into different sizes. Each size is then strung upon threads, made up into bundles, and packed ready for exportation.

The extent to which this manufactory is carried is astonishing. Many handred weight stand ready filled in casks, to be sent to all parts of the world, but particularly to Spain and the coast of Africa.

The travellers to whom we owe this account, were shown every part with the greatest civility, entertained with coffee, and presented with several patterns of glass pipes, and pattern cards that contained no less than sixty different kinds of glass beads.

Lond. Mec. Jour.

ON MOUTH GLUE, AND JOINING SHEETS OF DRAWING PAPER.

Mouth glue is the best substance hitherto known for joining several sheets of paper together, when a single sheet is not of sufficient size to hold the design.

This glue is in fact nothing but the common glue scented, in order to take away the disagreeable smell and taste of the glue. For this purpose, 4oz. of the best English glue is broken to pieces, put into a glazed earthen or stone ware pipkin, and is floated with cold water; after remaiming two or three days, the superfluous water is poured off, and the moistened and softened glue melted on a slow fire: when melted, 2oz. of common sugar is added by degrees; and some also add a spoonful of lemon juice—but this appears useless. The melted glue is then poured out on a marble slab, about 15 inches square; or even a wooden slab of the same size, a wall of wax being first made round the slab, and the whole rubbed with a rag well soaked with sweet oil. The mouth glue is left for four or five days to set, or until it can be removed in a cake, which is usually a quarter of an inch thick. After this, a napkin, folded in four, is placed on a board, and being put over the glue, the whole

is turned, so that the glue may lie upon the napkin; another of which, also folded in four, is warmed and placed on the cake of glue, and on that a board and weight. The cake is turned several times a day, for a fortnight and each time covered with a warm napkin. At the expiration of this time it should be sufficiently firm to stand on its edge without bending, but by no means brittle. The greater the weight it is pressed with, the thinner does the cake become. When sufficiently dry, the cake is to be cut with scissors, and the pieces, which are generally three inches long, eight or nine lines wide, and one line thick, are placed on the napkins, so as not to touch one another. The use of the weight is to prevent the curling up of the glue as it dries, and the napkins to absorb the oil it takes from the mould.

The two pieces of paper which are to be joined, are to be cut very strait with a penknife and steel rule: and, if the paper is sufficiently thick, both the edges may, by an expert artist, be cut half way through, so as not to increase the thickness. If this is not the case, the sheets are to be laid so that the slight bur made by the knife may be as little perceived as possible, which is done by putting one sheet with its right face, *i. e.* that on which the paper mark is read aright uppermost, and the other sheet with the other surface uppermost; then cutting the edge and afterwards turning them so that both may have their right face uppermost, and with their edges overlapping one another about a line or two, and a slip of paper, also cut very, straight, is laid on the under sheet, so as to meet the edge of the upper as close as possible. Both sheets, and this slip, are kept in their places by rules loaded with weights, and nicks are made on each side, to show if any derangement takes place. A piece of the glue, sharpened at the point, being then held in the mouth, between the teeth for three or four minutes, is to be taken out, and rubbed between the edges of the paper, in the middle of the joining, for about the breadth of an inch and a half. This being done as quickly and lightly as the artist can, a piece of paper is put on the joining, and the place is rubbed with an ivory knife, or handle of an office penknife A fresh piece on one side of this joining is then glued in the same manner; and then one on the other side, and so on alternately, first one side and then the other, until the whole of the edges are joined. The paper is to be shifted a little on the table each time, that it may not be accidentally glued to it, by the oozing of any part of the glue; and care must be taken that the glue be not rubbed too hard on the paper.

This operation, which requires great neatness, is best done when the sheet which is to be undermost lies next the artist. Many, for fear of having a pucker in the joint, begin at the end next the left hand, and proceed to the right. *ib.*

ON CONSUMING THE SMOKE OF IRON FURNACES.

Much has been said respecting the necessity of obliging the proprietors of large furnaces to construct them in such a manner as to consume their own smoke, which, in many cases, is extremely annoying to the dwellers in their neighbourhoood. In some cases, as in the furnaces of brewhouses, distilleries, lime kilns, or steam engines, the emission of a voluminous mass of dense thick smoke shows a faulty construction of the furnace, and is an evidence of the waste of fuel; for in these kinds of furnaces the smoke is not required to exert any chemical action on the materials exposed to the fire; all that is required of them being the acquisition of a certain temperature, by the least possible quantity of fuel.

But in the use of the reverberatory furnace in metallurgy, the presence of smoke is frequently necessary as a chemical agent in the reduction, or at least deoxidation of the metal.—The management of the fire used by the workmen who refine copper in reverberatory furnaces, exhibits this use of smoke in a very striking manner, and is a perfect illustration of the necessity that somtiemes exists

for the allowing of a dense volume of smoke to escape.

In the first part of the operation of refining copper, as soon as the metal is perfectly melted, the fireman keeps his grate open at bottom, so as to permit a free passage for air, and even allows a portion to enter at the door of the fireplace; so that a greater quantity of air passing over the bridge than is necessary for the complete combustion of the fuel, which is denoted by the absence of any smoke, the superfluous air may, as it passes over the melted mass of metal, oxidize, or, as the metallurgists term it, scorify the iron that is contained in the copper, which, however, cannot be done without oxidating some of the copper also, and he rakes off the scoria from the surface of the metal to clear it.

The iron being thus separated the workman, in order to prevent the farther oxidizement or scorification of the metal, which would diminish the produce, then stops the door of the fireplace completely, to prevent the passage of any air that way, and force the whole through the coals; which he takes care to make as compact as possible, in order that but little air may pass, and that the whole oxygen of that which does pass may be decomposed. In this case, much of the fuel is raised in smoke, some of which contributes to deoxidize any portion of the copper that may happen to be scorified, and the remainder passes off through the chimney into the atmosphere.

It is impossible, even in these furnaces, to so exactly adjust the quantity of air that shall pass to consume all the smoke, especially as part of the combustion would necessarily take place in the chimney, and of course some of the air would be applied to the surface of the metal, and scorify it. And if, to avoid this, and still to make an attempt to consume the smoke, air is admitted into the furnace or its chimney, beyond the surface of the melted metal, the draught of the furnace would be so materially injured that it could not be made to perform its office.

Now, in reducing iron stone to metal, there is occasion for the application of as much carbonic matter as possible, as iron is far more readily scorified, and less easily reduced than copper; consequently, it becomes scarcely possible to fulfil this intention without the escape of a considerable quantity of smoke; and all attempt to consume it must necessarily diminish the power of the furnace to perform its required purpose. *ib.*

ON PREPARING OIL FOR WATCH MAKERS.

It cannot but be known to all how much the quality of the oil used by watchmakers for oiling the works of their delicate machines, is of importance to them.

Colonel Beaufoy remarked, that if olive oil be exposed to the rays of the sun for a considerable length of time, it becomes colourless, clear like water, free from mucilage, and does not easily freeze. This effect was produced by exposing two half-pint phials nearly filled with oil to the sunbeams for a couple of years; the bottles were uncorked occasionally to let out the gas.

Chevreul has recommended the following process for freeing oil, for the use of watchmakers, from any acid or mucilaginous matter Put some salad oil into a matrass, or one of the Florence flasks in which it is imported, and pour on it eight times its weight of spirit of wine; heat the mixture until it is ready to boil, then pour off the spirit of wine, and let it stand to cool. A portion of solid fatty matter, called stearine, separates, and is to be taken away; and the spirit is to be evaporated away in a basin or distilled in a glass retort, until only about one-fifth part is left; by this means, the fluid part of the oil or elaine, as it is called, will be separated and deposited. This elaine ought to have the consistence of oil, be colourless, with little or no taste or smell; it should not discolour litmus paper, neither should it be easily congealable by frost.

ib.

ON THE MANUFACTURE OF POTTERY.

SIR,—The 'Operative Mechanic,' a work published in London 1825, contains an excellent treatise on the manufacture of pottery, from which I have made pretty free extracts, and will thank you to give them a place in your truly valuable Magazine. This work treats very fully on several other subjects, which may prove interesting, particularly to your manufacturing readers. Where information can be obtained without the turmoil of experience, I think it advisable to avail ourselves of it. With a hope, therefore, that my efforts to promote the interests of this class will be kindly appreciated, I shall also make extracts from them whenever leisure will permit.

Your obedient servant,

J. B. B.

"The natural compound, called clays, consist generally of pure clay, or alumine, combined with either silex or lime, and sometimes with magnesia, and the oxide of iron. The presence of magnesia may easily be detected by its imparting a soapy feel; and the iron by the clay burning to different shades of red, proportionate to the quantity it contains. The magnesia has obtained the name of soap-rock, and a marked variety of it steatite.

The clay is first put into a trough about five feet long by three wide and two and a half deep, with a certain proportion of water, and subjected to the process called *blunging*, which is a-kin to mixing. This is performed with a long piece of wood, formed into a blade at one end, and furnished with a cross handle at the other.

The bladed end is put into the trough, and moved backwards and forwards, up and down, with violence, till the clay be broken, and well levigated. The coarse particles of the clay sink to the bottom of the trough, while the finer parts remain suspended in the solution; and clay is continued to be added until the solution has acquired the consistence of thick cream. This thick liquid is passed into a large tub, and afterwards through fine hair and silk lawn seives, and then mixed with certain portions of a liquid of ground calcined flints which has likewise been passed through silk lawn sieves.

The China clay (*kaolin or decomposed felspar*) whichis used in every kind of earthenware, except the cream coloured, is sometimes put into the mass, and blunged with it; at other times it is put into another tub, and blunged separately, and is then mixed in proper proportions with the other *slip*.

The slip is now passed into another large stone or wooden cistern, and the parts which have not been previously are now added, and the whole is passed through fine lawn into a reservoir from whence it is pumped upon the slip-kiln.

When a steam engine is used, the clay is thrown into a vertical cast iron cone, about two feet wide at top, and six feet deep. Inside of this cone are fixed strong knives, having a spiral arrangement and inclination, and converging towards the centre. In the centre of these is worked a perpendicular shaft, with similar knives radiating from it, so that the knives, by the revolution of the shaft, cut in pieees every thing that is thrown into the cone, and force downwards, agreeably to the nature of the screw, whatever may be put in, till it is discharged through a small orifice at the bottom.

The clay, thus reduced to powder, is next subjected to the process of blunging. For this purpose it is thrown into a large circular vat, or cistern, having a strong vertical shaft of wood, with arms formed like a gate as radii, worked by the steam engine.

The vat is nearly filled with proper proportions of water and clay, which, by the rapid motion of the shaft, becomes well levigated and mixed, clay or water being added until the liquid is of the consistence of cream. The liquid is then passed along several trunks, at the end of each of which is fixed a fine hair or lawn sieve. These sieves have a quick horizontal motion communicated to them by crank machinery, which causes the slip to pass through into a large reservoir, where it remains till pumped upon the kiln. The flint, in its crude state, is similar to that used for striking fire, which consists of pure silex.—(*Quartz, well calcined, answers the same purpose.*)

The method of calcining it is, by placing it in a small conical kiln about nine feet deep, and altogether not much unlike that used for burning limestone. When red-hot, it is thrown into cold water to make it easier to reduce to powder, which is done either by machinery or manual labour; one man breaking *per diem.* sufficient to supply two flint pans twelve feet in diameter.

In the other process, the flints are put on a strong grating of iron, and struck by large hammers, moved by machinery, till they be so reduced as to fall through the grating, when they are taken to the flint mill. This mill consists of a chert, or quartzose bed, and four circular stones, formed of the same material, which journey on the bed by means of power communicated to a vertical shaft placed central to them, and furnished with arms.

The flints being put into the vat containing the mill, the whole is covered with water; power being now applied, the calcined flints, by their reciprocal action, are speedily reduced to an impalpable powder.

The semi-fluid is put into another vat, that has a similar vertical shaft; water is added, power applied, and the whole is well levigated. In this process, the weighty particles sink to the bottom, and the finest remain in suspension, which are then passed into a reservoir that has certain apertures for drawing off the surplus water, till it has subsided to a state fit for the potter's use. This is a very important operation, and is attended with some difficulty.

The manufacturer should be very choice in selecting the stones to be employed in the grinding; for should they contain calcareous carbonates, such parts will be abraded, and by mixing with the silecious matter will, in a subsequent process, prove a serious injury.

(To be continued.)

GRAVITATING FORCES.

At page 102 of the first volume of the American Mechanics' Magazine, your Correspondent G. A S. advances the following proposition:—

"When two or more bodies revolve at *equal* distances from the centre of their orbits, but with *unequal* velocities, the central forces (that is, the gravitating forces) necessary to retain them in their orbits will be to each other as the *squares of* their *velocities;* that is, if one body revolve *twice* as fast as the other, it will require *four* times the retaining force the other does: if with *three* times the velocity, it will require *nine* times the retaining force to make them describe equal orbits."

Taken, then, for granted, that the above proposition is correct, I would beg leave to propose the following Quere.

QUERE.

Supposing a loaded carriage, placed on horizontal railways to weigh, while at rest a ton, what would be its respective weights, or, in other words, its specific gravity, were it impelled thereon at the rate of 4, 8, 16, or 32 miles per hour?

An answer to the above Quere will much oblige

Your obedient servant,

J. S.

New-York, Aug. 29th, 1825.

ON HANGING SLUICE DOORS AND FLOOD GATES.

Mr. Marriatt, of Liverpool, observes, that the usual methods of hanging doors intended to keep up water, are often very tedious and troublesome to open; whether they are opened as common doors, or made to rise and fall by machinery; hence, he considers the following method as in many instances preferable:—

A rectangular door, being fitted to the place, is to be hung, by placing across it strong gudgeons, which are to turn in holes made in the jambs, or in a wooden frame made for that purpose; or they may play in circular holes made in the stone-work.

In order to determine the proper situation for these gudgeons, find the centre of pressure of the door, according to the depth to which the door is to be immersed in the water; and, drawing a line horizontally through this centre, place the axis of the gudgeons so that the door may turn upon the gudgeons in this line.

The door, thus hung, can be opened with the smallest force possible; it will also remain in any position in which it may be put, and consequently any quantity of water may be evacuated at pleasure. It may also be closed again with the greatest possible ease; for as the pressure of the water above and below the axis on which the door turns, is equal in every position of the door, any effort that is sufficient to overcome the friction of the several parts, is all that is required to open or shut the door.

In situations where the door is liable to be choked up with sand, much labour and expense is required to open them when hung in the common way; but if hung in this manner, the door may be easily rsised to a small height, and this being effected,

the water will soon make its way, and carry the sand away with it.

As these doors must always remain across the sluice way, this mode of hanging cannot be applied when large vessels have to pass in and out; but it will do for small craft; and in those situations where navigation is not practised, is superior to the common method.

When the upper part of the door is even with the surface of the water, the distance of the line of pressure, on which the door ought to revolve, is two-thirds the length of the door from the top. In every other situation, whether the top of the door be above or below the surface of the water, the centre of pressure coincides with the centre of oscillation, and is easily determined.

Lond. Mec. Jour.

ON ITALIAN CABINET WORK.

The xcellency of the cabinet work made at Rome, is generally esteemed as superior even to the French, in the finish the artificers give it. Mr Reveley, who has paid great attention to their process, has lately given his knowledge to the public.

The marks of the plane are got rid of by the use of a steel scraper; after which the work is rubbed over with linseed oil, and farther polished with a flat piece of pumice stone, which has been sawn across its grain, and moved in a circular direction until all the marks of the scraper are rendered invisible; the sludge of the ground pumice is then wiped off, and the wood again covered with linseed oil.

The next process is to rub the wood with the part of a cuttle fish bone that is next the hard crust, which must be carefully removed for that purpose; and the sludge formed by this bone being removed, the finishing polish is given to the wood, by dusting it over with fine dry powder of soft burnt bricks, applied with a woollen cloth, until the wood has acquired a beautiful polish.

The wood is then varnished; for which purpose a rubber is formed of a sponge enclosed in several folds of linen rags, the outside fold being of very fine linen—the face of which being dippped in the varnish, and a little salad oil being put in the centre of the varnish by means of the finger, the rubber is to be applied also in a circular direction. The Roman cabinet makers do not hurry their work, but allow four days to polish a table.

When a very dark colour is to be given to the wood, Mr. Reveley recommends it to be dyed with a solution of silver in aquafortis; or, which is nearly the same, of the nitrate of silver in distilled water, before it is polished. *ib.*

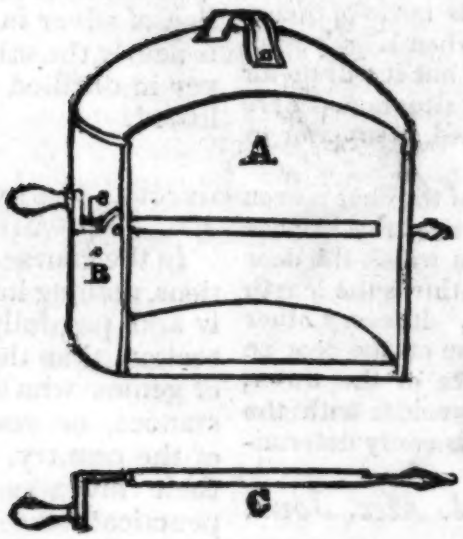
ENCOURAGEMENT OF INVENTIONS AND DISCOVERIES.

In the course of our editorial avocations, nothing has been more frequently and painfully forced upon our attention, than the difficulty which men of genius who are in humble circumstances, or resident in remote parts of the country, experience in turning their inventions and discoveries to practical account, for the benefit of themselves and the public. Our table is covered with letters from individuals thus situated; some stating their inability to bring forward designs which they conceive to be of undoubted utility; others submitting hints and suggestions, which they wish to be subjected to the test of experiments, the expense of which they are unable to defray, or do not feel themselves justified in risking; others again, complaining that improvements which they have perfected, and the right to which they have secured to themselves, remain neglected and unproductive, from the insufficiency of the means that have been employed to introduce them into general use; and all soliciting, in one shape or other, assistance, which we have been able but in a few instances to grant or procure for them.

The recurrence of these circumstances has led to steps for the formation of a joint stock association, to be entitled, "The British Invention and Discovery Company, for the Assistance, Encouragement, and Protection of Native Genius, and the profitable investment of Capital, in the prosecution of original invenventions and discoveries by British subjects. The proposed capital is 750,000*l.*, to be raised in 15,000 shares of 50*l.* each. The scheme was first publicly announced on Monday last, and already there are more than the whole number of shares applied for.

Lond. Mec. Mag.

IMPROVED OVEN.



SIR,—The above sketch of a very simple and economical method of roasting small joints is found to answer remarkably well; if you think it worthy your notice, it is at your service.

Your constant reader,

F. I. L.

Description of the engraving.

A is a Dutch oven (any common Dutch oven will answer the purpose.)

B, five holes; through the centre one the spit is put; the others are to receive successively the hook which keeps the spit in the position required.

C, the spit.

There is a slit cut immediately under the five holes, to take the spit out, with the meat on.

March 7th, 1825. *ib.*

TO MAKE GOOD CIDER.

SIR,—The fruit should be of good quality sound and mellow, and ought not to be ground till late in the fall. The straw used for packing the pumice should be scalded or steeped in hot water, and then be partially dried before applied. This process is necessary to prevent an extraneous flavour being imparted to the liquor; and for a like reason, the pumice, when good cider is wanted, should not be pressed too closely. No water should be added to the juice, and if a greater portion of spirit should be required than it will afford by fermentation, two or four pounds of brown sugar may be added to each barrel measure. This will answer a better purpose than brandy, or the usual mode of concentration; because the flavor will be homogenous, partaking only of the apple.

When the sugar is dissolved, the liquor should be filtered through clean straw, confined with two or more thicknesses of flannel; it should, in the next place, be put into a cask to undergo fermentation.

During this process, it is advisable to keep the cask filled, so that the heterogenous matter which is disengaged may escape at the bung-hole; and this should be performed through another, in preference to the voiding aperture.

When the recrement or scum turns of a brownish colour, and slghtly falls, it should be removed. The cask should be bunged closely, but not so tight as to endanger its bursting. If after this the fermentation should continue to the injury of the flavour or quality of the cider, it should be again filtered as before, put into a clean cask, and sulphured. This operation is performed by partially filling the cask with cider, burning a few brimstone matches in it, stopping it close, agitating the liquor and the sulphurous fumes together, and then filling and stopping as before.

In February, or whenever wanted for the purpose, it should be again slowly filtered through clean materials, replaced in a clean cask, and be subjected to the fining process. This is performed by dissolving isinglass or fish glue shavings in warm water, thoroughly mixing it with the cider, stopping it close, and suffering it to rest.—When perfectly settled, it may be drawn off into a clean cask, or bottled for use.

The bottles should be well cleansed, closely corked, and placed in a cool part of the cellar. When thus prepared, a slow fermentation takes place, carbonic acid is formed, and imparts to the cider that briskness which is esteemed by the lovers of this beverage as a principal characteristic of its excellence. This fermentation may be hastened by introducing a raisin into each bottle; but this, not unfrequently, causes them to break, especially if kept for a considerable time.

If to the juice, as it comes from the press, argol, or crude tartrate of potash (unrefined cream of tartar) or even cream of tartar be added, in proportion of two pounds to the barrel, along with four or five lbs. of sugar, and the fermentation be caused, to a certain extent, to take place over a few pounds of limestone, a very good wine will be formed; and if the pulp of common grapes, or raisins be added along with the other materials, the quality of the wine will be still more improved. Care should be taken to stop the fermentation before it arrives to the acetous stage; or the limestone chips or chalk should be removed, at an early part of the process, otherwise its solution, over and above the capacity of the malic acid contained in the liquor, may impart a slightly bitter taste to it.

In the same manner, excellent wine may be made from currants, and the sugar required for the operation does not amount to one fourth part as much as is used in the ordinary process. The writer of this article has made the experiment, and speaks confidently on the subject.

Some care and experience is necessary to insure success; and should the manipulator fail in his first attempt, he ought not to be discouraged, but repeat the experiment till he succeeds. The result, if it should only relate to his own health and comfort, will amply compensate him for his trouble.

In general, the article of cider is badly prepared in the United States; and it is more owing to carelessness, and inattention in the mode of preparation and preservation, than to the quality of the fruit; though this latter circumstance is often shamefully neglected; the manufacturer, often expressing the juice from fruit, for his own drinking, which, from its decayed condition, his domesticated animals would disdain to eat.

Such liquor, apart from its ill flavour, is really unhealthy; and although persons, who generally dink it, may not experience any perceptible injury, it by no means follows that such is the fact; for habit, and a strong constitution, often resist powerful shocks for a long time; but how much longer would such a constitution last, if its strength had never been tried!

Your obedient servant,

Chester County, A FARMER.
September 10th, 1825.

ON THE MAKING OF FOOT BALLS AND BALLOONS.

The game of foot ball is but little played in England, although susceptible of as much interest as any other; and when played, is performed in a very inferior manner to that in the south of Europe, particularly in the southern provinces of France, where the villagers play it with a kind of madness, and where it holds the same rank as our cricket.

The common English foot ball. sold by the turners, is nothing but a leather bag, made of basil skins cut into slips pointed at each end, so that when sewed together they may form a spheriod, But as these basil slips, thus sewn into a ball, will not hold the wind, a pig's bladder, rather larger than the ball. is introduced through a hole left for that purpose. After this is done, the bladder is blown up, by means of a small pipe of ivory or horn; and the neck of the bladder being tied, to prevent the escape of the wind, it is pushed inwards, a piece of leather being introduced between the bladder and the opening by which it was introduced; the opening is closed by drawing up this opening by means of a string running in a turning over of the edge, in the same manner in which many purses are closed. This kind of ball is usually driven by the feet, whence the general name; or sometimes by the fist. It rebounds the more, the more the air is compressed in the bladder.

There is another kind of foot ball; or, more properly speaking, balloon, which was formerly played by our own gentry, before the civil wars in Charles' reign; the origin of which is lost in the height of its antiquity. This ball play was well known to the Greeks, who, unlike those who now usurp their name for begging purposes, were fond of gymnastic exercises. It was also known to the ancient Romans, and has spread into Spain and the southern provinces of France. In this latter country, almost all the towns, and all the villages, have enclosures, frequently walled round, or otherwise closed, to play at balloon, and to keep the spectators,

who are always very numerous, safe from those bruises which they would be in the way of receiving, and by which they might be dangerously hurt.

The balloons used in this game are smaller than those of our common English foot balls, and are only four inches in diameter. They are composed of four parts, viz:—

1, a bladder.

2, an envelope of good chamois leather.

3, a second envelope of strong leather.

4, a copper valve, which opens inwards, and is capable of keeping in a considerable pressure of air.

To make the bladder, a pattern is drawn geometrically, to form the segments of a sphere of four inches diameter, leaving about the sixth part of an inch for overlapping all round each segment. The segments are cut out of a strong hog's bladder, well prepared; that is to say, one which has had all its fatty parts separated by the knife and strong pressure between spongy papers. These segments are then glued together, by the overlappings, except at one pole, where the valve is placed, and strongly glued to the bladder.

The valve itself is a small cylinder, four lines, or twelfths of inches in diameter, soldered in the centre of a round plate of twice that diameter. The cylinder is pierced with a hole of three lines, and the plate has a hole of only one line, by which the air is introduced. The valve is placed under the plate, in the inside of the balloon, and is nothing but a piece of leather fastened at its two ends. When wind is blown in, the leather gives, and allows the wind to enter; but in proportion as the air is compressed within, it acts against the leather, which then closes the whole, and prevents its exit. The upper face of the plate is spherical, with furrows, that the glue may hold better upon it. The cylinder is only two lines long, being the proper thickness of the balloon; it is turned on the inside in a thread, to screw on to a forcing syringe or condenser.

When the bladder is made, and the glue well dried, it is blown up by the valve, and a second layer of bladder slips is glued all over it, so that their length may run across the seams of the former layer. When this layer is dried, more wind is blown in, and slips of wash leather are glued over the whole; taking care that the edge of the leather be pared, so that although doubling over the neighbouring slips, yet that the joints may not be thicker than the other part. Lastly, the whole is covered with strong leather, either hammered or moulded, while wet, into a hemispherical form, or that of a quarter of a sphere.—These halves or quarters are then sewed together in a strong manner, like our best cricket balls; and the balloon is finished.

To fill the balloon, a condensing syringe is screwed into the cylinder of the valve: the balloon is then placed between the feet, and the wind is forced in with the utmost force of a strong man. The syringe being then removed, a leather tap is screwed into the hole of the cylinder to secure it. This balloon, when well made and filled, is very hard, and extremely elastic. When it is struck against the ground with force, it often rebounds fifteen or twenty feet high.

It is not possible to play with this balloon by means of the battledore or raquet, as it would soon break them; and still less with the naked hand, which could not bear such powerful strokes. The ancients wrapped the fist round with long straps of leather, making several turns one upon the other, and struck the ball with the fist thus guarded. This method, however, has some defects; and in the south of France, a brassart has been employed from time immemorial to strike the balloon with more force.

This brassart, or bracer, as our ancestors called it, is an artificial fist, made of a piece of hard wood, such as live oak. It is pierced with a hole sufficiently large to admit the fist with ease, but without much room to play. A round piece of wood is placed across this hole, which is firmly fixed, and laid hold of by the player. The outside of this brassart is slightly conical, and its surface is covered with deep grooves, cut across one another, so that the whole of the surface is covered with strong teeth, or pyramids, about three-quarters of an inch high, and as much square at the bottom. The object of these teeth is to prevent the balloon from slipping from the blow; for which reasons the grooves are so placed that they are always closed at the end by the body of the next tooth; all of which are of course placed in a quincunx, and not in chequers.—The top and bottom of the brassart are bound with an iron hoop, to strengthen it; and when used, the hand is introduced at the narrowest end.

Lond. Mec. Jour.

CURIOUS ACTION OF WATER ON MELTED GLASS.

Mr. Parkes; in his Essays, has adverted to some appearances produced by water flung upon glass when in the furnace, which appear extremely strange, although they were related to him by the most undisputed authority:—

If a small quanlity, even a pint of water, were to be thrown into a crucible of glass in a melted, or rather melting state, while the scum or sandiver is upon its surface, the water would be converted instantly into steam, so that an explosion would take place; and if the quantity of water were more considerable, the furnace would probably be blown down.

But when the sandiver has been scummed off, and the glass in quiet fusion, if water is thrown on it, the globules dance upon the surface of the melted glass for a considerable time, like so many globules of quicksilver upon a drum head, while the drummer is beating it.

There is, however, a similar appearance to this that takes place in iron; for water evaporates sooner from a plate of iron that is heated to redness only, than from a plate that has been brought to a welding heat, or very near to the heat necessary to melt it.

But in the manufacture of black bottles it frequently happens that while the workmen are employed in moulding and blowing the bottles, that the glass, or metal as it is called, becomes too cold to work, so that they find it necessary to desire the fireman to throw in coal, and increase the heat.

This, however carefully it may be done, will sometimes produce so much dust that the surface of the glass becomes covered with coal dust. When this accident occurs, it occasions such a motion within the melting pot, that the glass appears as if it were actually boiling; and if the metal was used in this state, every bottle would be speckled throughout, and full of air bubbles.

Now, as it would be very inconvenient to wait for the whole of this coal dust to be consumed by the fire; and besides, it might occasion the glass to melt over the edges of the melting pot, the workmen have to endeavour to discover an easy and effectual remedy for this accident; and this remedy is no other than common water.

Whenever this circumstance takes place the workmen throw a little water into each of the melting pots. This water has the effect not only of stilling the boiling of the glass immediately, but it also renders the melted metal as smooth and pure as before.

Mr. Parkes considers this curious and almost instantaneous effect, as probably owing to the water becoming decomposed, and affording its oxygen to the coal dust, and thus converting it into carbonic acid gas, which immediately escapes and is dissipated in the atmosphere. *ib.*

PLAN OF A STEAM BOAT WITH ONE WHEEL IN ITS CENTRE, PROPER FOR CANAL, RIVER, OR SEA NAVIGATION.

Sir,—As one of the most desirable improvements in Steam Boats is the dispensing altogether with the side-paddles, thereby increasing their velocity, by causing them to hold less wind, I am induced to send you a few lines upon the subject; and should you think proper to insert them, the idea may possibly be improved upon by the scientific, and ultimately produce the desired effect.

Description of the plan.

By this plan, when the water rises above its level in the paddle-box, it escapes by its own weight through the channels, each of which is terminated by a port hole, a little above the water-line in the midships. The channels are also furnished with valves that are self-acting, and permit the escape of the internal, and at the same time prevent the ingress of the external fluid. These ports being closed, either in foul weather, or in consequence of any accident occurring to the machinery, instantly convert the steam into a perfect sailing vessel. Of course it must be understood that this boat is propelled by a single wheel in its centre and I find by experiments on a minor scale, that its steerage is equally unaffected as in boats of the present build.

The London Engineer was built nearly upon this principle, and failed, only because the paddle-box filled with the back water, which the air pumps were not powerful enough to reduce or get rid of. To

accomplish this, I propose that the channels, &c. shall be as described above.

An objectien may be started, that upon this plan, the wheel would have to propel a double body, the after part of the paddle-box operating as the second. To this I reply. that until the accumulating water stopped the wheel in the London Engineer, she made as much way as her most sanguine friends could have anticipated.

Unwilling to trespass farther on your valualuable pages,

I remain your obedient servaut,

PHILO-TECHNUS.

ib.

NECESSITY OF PROTECTING HUMBLE GENIUS.

The necessity of such an Institution as that for the "Assistance, Encouragement and Protection of Native Genius," is strikingly exemplified in an able article on the subject which appears in the "London Journal of Arts and Sciences." It details a most heart-rending case of hardship and suffering, arising from the want of that aid which this Company is intended to supply. The unfortunate sufferer was James Cross, the inventor of a substitute for draw boys, which we have before noticed in our pages :—

"At various times he had effected many important improvements in the weaving machinery used for figured fabrics, which, by his unwearied application, he at length brought to such perfection, as, with other great advantages, to render unnecessary the use of draw-boys. During the progress of his labours, he was frequently encouraged by the manufacturers of Paisley, who saw and fully appreciated the value of his genius, with hopes of ample remuneration for his persevering application. But when the inventions were pronounced complete, and *more than* his little means had been expended in arriving at this perfection, his only recompense was the high *verbal* approbation of his munificent and benevolent patrons ; and that too, *after they had been entirely satisfied by actual experience of the great worth of the invention, and were daily reaping benefit from them.* The Board of Trustees for the improvement of manufactures in Scotland, awarded poor Cross a hundred guineas, which alone is a convincing argument in his favour; but this liberal gift was sunk in the perfection of his invention, and even then the poor victim was involved in debt. Unable to sustain such a pressure of accumulated misery, his health, previously injured by the privation he underwent to gather the means to prosecute his work, gave way to anguish and blighted hopes; and after more than twelve months lingering in expectation of at least a partial fulfilment of the brilliant prospects which had been held out to him, he died the broken-hearted sacrifice to avarice and base ingratitude, leaving a young, helpless, and motherless family, to inherit his PENURY and FAME.

———'What man seeing this,
And having human feeling, does not blush
And hang his head, to think himself a man?"

"Mr. Cross's numerous inventions form a grand era in the history of the art of weaving, and will be admired by posterity when the name and the woes of the humble author will have sunk together to oblivion; but we can here only give a brief outline of them. So early as 1804, he first commenced his observations upon the defects of the machinery then used for weaving; and almost every succeeding year his fertile genius produced some valuable improvement. In 1817—18, he made the first working model of his machine for weaving harness-work without the aid of draw-boys, and submitted it to the inspection of a number of manufacturers and operative weavers, who unanimously spoke of it with the highest encomiums.

"This model being on rather a contracted scale, and necessarily imperfect, he was strongly recommended to construct one of larger and more serviceable dimensions, and was given to understand that his adviser would cheerfully pay every expense, whether or not his attempts were successful.

"Thus encouraged, he proceeded in his labours; but from many untoward circumstances, they this time proved unsatifactory, after incurring an expense of 18*l.* 15*s.* 6*d.* To defray this, as had been promised, a subscription collected amongst the manufacturers produced 12*l.* 15*s.* 6*d.*—leaving him a loser of 6*l.* besides much valuable time. Notwithstanding these losses and frequent interruptions, from his very weak

state of health, by persevering industry, during every moment's respite from disease, in 1820, he erected a larger machine. This he submitted to a Committee of manufacturers and weavers, who very highly approved the principle, and warmly recommended a meeting, to "consider the propriety" of remunerating him.

"A subscription for the purpose of enabling him to prosecute his labours yet farther, was the consequence of this meeting, and the liberal amount of the collection was 16*l.* 7*s.* 6*d.*—from which poor Cross had to pay for wages, &c. upwards of 12*l.* With the residue to "*prosecute his labours*," and maintain his family (then six in number, entirely dependent on him) for five months. Subsequently, being blessed with a short return of comparatively good health, and yet undismayed by the pitiful encouragement he received, he finished another machine of more extended and perfect operation. This also he laid before Committees of weavers and manufacturers. They were now so fully satisfied of his merits, that they this time gave *written testimonials* of their approbation; (one signed by eighteen, and another by fifteen individuals;) and a general meeting was called to reconsider the propriety of rewarding him, to which the public were invited by a circular letter widely distributed. At this meeting, a statement* of the poor sufferer's inventions was read, as also the flattering reports of the weavers and manufacturers, who had witnessed the operations of the completed machine; and the weavers were examined who then had it in actual practice. A subscription again succeeded this parade of mock generosity, and produced the magnificent sum of 3*l.* 1*s.* 6*d.* Such was the noble fulfilment of all the enticing prospects held out to him—all the generous promises, which induced him to sacrifice time and health, which might, and would otherwise have been employed advantageously for himself and family.

"In making the numerous experiments necessary to enable him to bring the invention to perfection, he expended and contracted debts exceeding 100*l.* exclusively of the maintenance of his family during the long period that he was so engaged; and for this, the whole recompense he received from the manufanturers amounted, as we have shown, to 31*l.* 14*s.* 6*d.*! He now became but too fully sensible how miserably he had been deluded; and oppressed by all the horrors of debts, which he saw no possibility of repaying—harassed by continual anxiety, both of body and mind, and the bitter conviction of his utter destitution, his energies gave way beneath the accumulated mass of woe, his enfeebled body became the prey of sickness, and he sunk into a state of entire helplessness. Thus he lingered, the miserable victim of his own powerful genius, till March, 1824, when, at the early age of 45, he was happily released from farther earthly trouble. Previously to his death, he had the satisfaction of seeing his machine generally adopted by the liberal mamufacturers, and several grave-written testimonies of the great benefit they derived from it. The noble donation of the Board of Trustees came to cheer his latter days also, but it was too late to renovate his worn out frame. But for the real benevolence of one individual, his four orphans (three girls and a boy, the last but six years old) must have become entirely destitute, and have suffered the very extreme of want. By his humane aid, however, and the employment of the eldest girl as a servant in one of the manufactories, as far as the calls of nature go, they are perhaps as well provided for as many of their neighbours in the same class; but not one of them has yet received *any education whatever*, and unless benevolence again exert itself, there seems no possibility of their ever obtaining it.

"Such has been the melancholy fate of one individual, and this one instance, it is hoped, will be thought a sufficiently convincing demonstration of the urgent and crying *necessity* for the adoption of instant and energetic measures for obtaining a permanent barrier to its recurrence."

* "Extract from the Report of the Manufacturers, &c. being the statement alluded to:—

'Amongst the many improvements which Mr. Cross has made for the trade, may be mentioned—The Eyed Standard for Gauze Mountings; the Black Hiddles for Pressure Harnesses; the Barrel Machine and Harness; the extending Tail for double Harness, for contracting the Flowers, which in many cases, saves, nearly one-half the expense of flower-lashing, the dressing treddles not being required as formerly.'

THE MAKING OF GOLD BEATERS' SKIN.

THE intestines of animals are made use of in several trades, and are prepared for their use by different manu-

facturers,—as the bladder-makers, who prepare the small intestines of oxen for the use of German and Bologna sausage-makers; the catgut-makers, who prepare the intestines of horses for the coarse catgut used by turners; and those of sheep for the catgut used byracket-makers, violin-makers, hat-makers, and clock-makers

The large intestines of oxen are also used by the sausage-makers; these intestines include that part called the blind gut, the peritoneal membrane of which being torn off, is made into gold-beater's skin.

As soon as the workman has cut just through that part of the peritoneal membrane that surrounds the bottom part of the blind gut, he gives it a pull, and it comes off of the length of from two feet to two feet and a half turned inside out. This is then dried in the air, and when it is dry it appears like a mere cord. The maker of gold-beaters' skin then soaks it in water to which a very small quantity of pearlash has been added: when sufficiently moistened, the skins are placed upon a table, and the mucous membrane is peeled off with a knife. When the skins are well cleansed, and thoroughly soaked with water, they are stretched upon a wooden frame, three or four feet long, and ten inches broad, formed of two uprights, connected by two cross pieces. These four pieces have, lengthways, a groove about a quarter of an inch broad.

To stretch the skin, the worman takes it in his hands, and places one of the ends upon the upper end of the frame, taking care that the side of the skin, which was the external side when in the animal, shall be that next the frame. He then pulls it every way, and makes it stick to the edges of the frame. This being done the workman takes another skin and applies it to that which is already spread out, taking care that the two insides of the skin, or those that adhered to the muscular membrane of the intestine, shall come together. By this simple means, the two skins adhere strongly together, and form only a single body.

The doubled skins dry very qaickly, except that part which is fastened to the cross piece of the frame. When the whole is dry, the workman cuts the skin with a sharp knife, the knife being guided by the groove already mentioned. The slips of gold-beaters' skins are then transferred to another workman, to be finished.

For this purpose the finisher takes each slip, and stretches it again upon a frame similar to the former, but without a groove. He spreads the edge of the frame with glue, and places the skin upon it; when dry the skin is washed with a solution of an ounce of alum in two points of water, and again let to dry, After this, the skin is covered, by means of a sponge with a strong jelly of isinglass dissolved in white wine, in which several spices have been soaked, such as cloves, nutmegs, ginger, camphire, These last ingredients are added to prevent insects from attacking the skins,

Being thus finished, a coat of white of eggs is given to them: they are cut into square pieces of five inches each way, and put under the press to flatten them; after which they are made up in heaps, or books, and sold to the gold-beaters,

In some future Number the method of making catgut will be given,

Lond. Mec. Jour.

Communications for the American Mechanics' Magazine, Post paid, and addressed to

JAMES V. SEAMAN,

Broadway, New-York, will receive due attention.

William Van Norden, Printer.